PIONEER®

Service Manual

CIRCUIT DESCRIPTIONS
REPAIR & ADJUSTMENTS

ORDER NO.
ARP-694-0

FM/AM DIGITAL SYNTHESIZER TUNER

F-99X

- **Model F-99X comes in two color design, black and silver.**

MODEL F-99X COMES IN SIX VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks	Black	Silver
KU	AC120V only	U.S.A. model	○	–
HE	AC220V, 240V (switchable)	European continent model	○	○
HB	AC220V, 240V (switchable)	United Kingdom model	○	–
S	AC110V, 120V, 220V, 240V (switchable)	General export model	○	–
S/G	AC110V, 120V, 220V, 240V (switchable)	U.S. Military model	○	–
HEZ	AC220V, 240V (switchable)	West Germany model	○	○

- **This service manual is applicable to the KU type. For servicing of the HE, HB, S, S/G and HEZ types, please refer to the additional service manual.**
- **Ce manuel d'instruction se refère au mode de réglage, en français.**
- **Este manual de servicio trata del método de ajuste escrito en español.**

CONTENTS

1. SPECIFICATIONS 2
2. FRONT PANEL FACILITIES 3
3. PARTS LOCATION 4
4. EXPLODED VIEW AND PARTS LIST 5
5. ELECTRICAL PARTS LIST 6
6. ADJUSTMENTS 9
   RÉGLAGE 12
   AJUSTE 15
7. P.C. BOARDS CONNECTION DIAGRAM 19
8. SCHEMATIC DIAGRAM 21
9. BLOCK DIAGRAM 25
10. CIRCUIT DESCRIPTIONS 27
11. PACKING 28
12. SAFETY INFORMATION 29

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS [USA] INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
TEL: [800] 421-1404, [800] 237-0424
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775-28-08
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia
TEL: [03] 580-9911

1. SPECIFICATIONS

FM Tuner Section

Frequency range
(except S and S/G models) ..... 87.5MHz to 108MHz
(S and S/G models) ..... 88MHz to 108MHz
Usable Sensitivity
NARROW ..... 10.8dBf, IHF (0.95 μV/75Ω)
50dB Quieting Sensitivity (KU model) .....
NARROW ..Mono; 12.8dBf, IHF (1.2 μV/75Ω)
Stereo; 34.8 dBf, IHF (15 μV/75Ω)
50dB Quieting Sensitivity (except KU model) ....
NARROW ..Mono; 15.3dBf, IHF (1.6 μV/75Ω)
Stereo; 35.9dBf, IHF (17 μV/75Ω)
Sensitivity (DIN)
NARROW ..... Mono; 0.75 μV/75Ω
Stereo; 20 μV/75Ω
Signal-to-Noise Ratio .... Mono; 94dB (at 80dBf)
Stereo; 87dB (at 80dBf)
Signal-to-Noise Ratio (DIN) ..... Mono; 76dB
Stereo; 73dB
Distortion (at 80dBf)
WIDE ..... Mono; 0.015% (100Hz)
0.0095% (1kHz)
0.02% (6kHz)
Stereo; 0.02% (100Hz)
0.02% (1kHz)
0.07% (10kHz)
NARROW ..... Mono; 0.09% (1kHz)
Stereo; 0.5% (1kHz)
Capture Ratio ..... 0.8dB (WIDE)
Alternate Channel Selectivity .....
NARROW 85dB (400kHz)
Stereo Separation
WIDE 65dB (1kHz)
55dB (20Hz to 10kHz)
Frequency Response .. $^{+0.2}_{-0.8}$ dB (20Hz to 15kHz)

Image Response Ratio 70dB
IF Response Ratio 100dB
AM Suppression Ratio 70dB
Spurious Response Ratio 80dB
Subcarrier Product Ratio 60dB
Muting Threshold 25.2dBf (5 μV/75Ω)
Antenna Input ..... 75Ω unbalanced

AM Tuner Section

Frequency range
(except HB model). .530kHz to 1 600kHz
(HB model) ..... 531kHz to 1602kHz
Sensitivity (IHF, Loop antenna) ..... 150 μV/m
Selectivity ..... 18 dB
Signal-to-Noise Ratio 50dB
Image Response Ratio 40dB
IF Response Ratio 60dB
Antenna ..... Loop Antenna

Audio Section

Output (Level/Impedance)
FM (100% MOD) FIXED 650mV/900Ω
AM (30% MOD) FIXED 150mV/900Ω

Miscellaneous

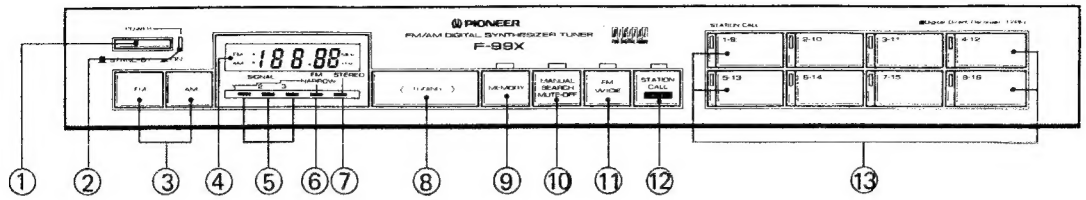
Power Requirements
HE model ..... a.c. 220Volts ~, 50/60Hz
HB model ..... a.c. 240 Volts ~, 50/60Hz
KU and KC models ..... AC 120V, 60Hz
S, SS and S/G models .....
AC 110/120/220/240V (switchable) 50/60Hz
Power Consumption 20W
Dimensions ..... 457(W) x 63.5(H) x 312(D)mm
18(W) x 2-1/2(H) x 12-5/16 in
Weight (without package) ..... 4.5kg (9 lb 15oz)

Furnished Parts

FM T-type Antenna 1
AM Loop Antenna 1
Connection Cord with Pin Plugs 1
Adaptor Plug 1
Wood-Grain Side Panel 2
Operating Instructions 1

NOTE:
Specifications and design subject to possible modification without notice.

2. FRONT PANEL FACILITIES



① POWER switch

When this switch is set to the ON position, the POWER indicator lights up, and power is supplied to the tuner's main circuits. The unit's POWER switch is geared to selecting the transformer's secondary and so even at the STAND-BY position, the unit's circuitry will work as long as the power cord is connected to power outlet. Disconnect the power cord from the power outlet when you do not plan to use the unit for a long period of time.

② POWER indicator

③ FUNCTION switches

These are used to select either the FM or AM broadcasting bands.
FM: Push to receive FM band broadcasts.
AM: Push to receive AM band broadcasts.

④ Frequency display

This shows the frequency of the station currently being received in digital form.The FM band is indicated by MHz, and the AM band by kHz.

⑤ SIGNAL indicator

This indicates the strength of the signal received. Adjust antenna orientation, etc. so that a maximum of the indicator elements light up.

⑥ FM NARROW indicator

This light to indicate FM reception in the narrow mode.

⑦ FM STEREO indicator

This lights when a stereo program has been picked up during an FM broadcast.

⑧ TUNING switch

These are used to locate stations. Push the left half of this switch "<" to locate a station broadcasting on a lower frequency and the right half of this switch ">" to locate a station broadcasting on a higher frequency.

⑨ MEMORY switch/indicator

This is used to memorize stations. When the switch is depressed, the MEMORY indicator will light. To memorize the frequency of any station, press the STATION CALL switch while the MEMORY indicator is lighting up.

⑩ MANUAL SEARCH/MUTE-OFF switch/indicator

This switch is used to select either AUTO or MANUAL tuning. For MANUAL tuning, press the switch; the indicator will light. The MUTE function is OFF during MANUAL tuning. If the signal from a station is comparatively weak, or if the station is some distance away, reception may not be possible using AUTO tuning. In such cases, the use of MANUAL tuning is recommended.

MUTING

Muting is incorporated to eliminate FM inter-station noise that can be heard when a station is not tuned in accurately. It may not be possible to tune in the desired station when the muting circuit is activated if the signal is weak or if the station itself is distant. If so, perform tuning without using muting. Muting does not function for AM reception.

⑪ FM WIDE switch/indicator

This switch is used to change the FM reception mode between WIDE and NARROW. When pressed, the indicator lights, and FM reception is set to WIDE.

FM WIDE:	Permits high quality, low distortion FM reception.
FM NARROW:	Use if interference from neighboring stations is present during FM reception.

⑫ STATION MODE switch/indicator

This switch is used to set the STATION CALL switches to Mode 1 (1 – 8) or Mode 2 (9 – 16). Mode 2 (9 – 16) is obtained when the switch is pressed and the indicator is lit.

NOTE:
Changing the position of this switch has no effect on tuner performance itself.

⑬ STATION CALL switches/indicators

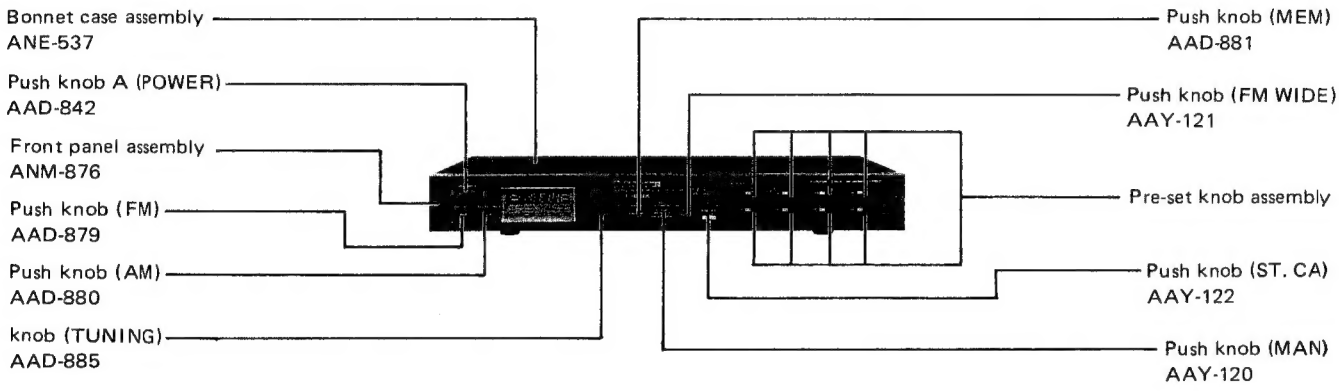
Use for presetting of desired stations and for reception of preset stations. These STATION CALL switches can be used to preset a total of 16 AM and FM stations.

3. PARTS LOCATION

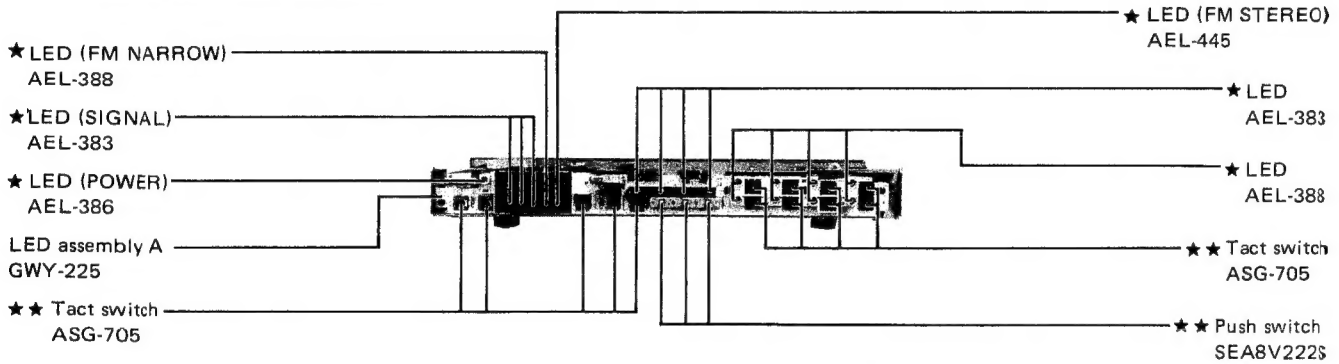
NOTES:

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

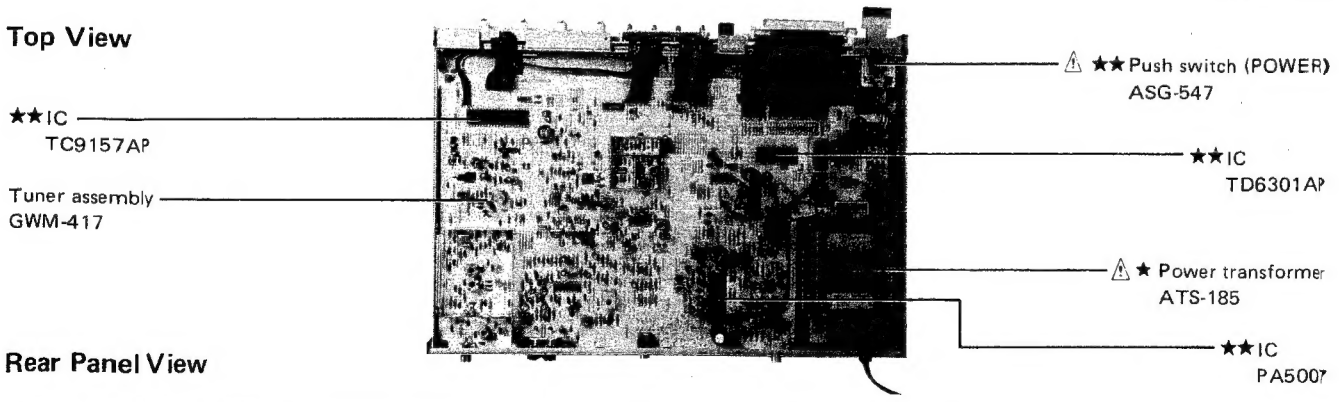
Front Panel View



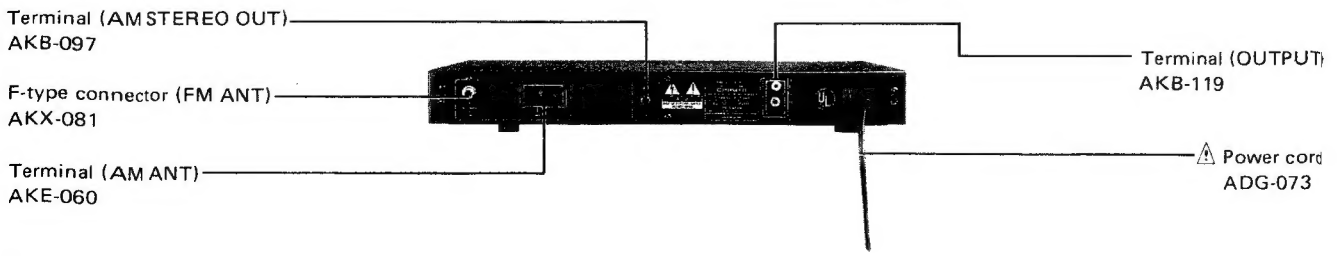
Front View with Panel Removed



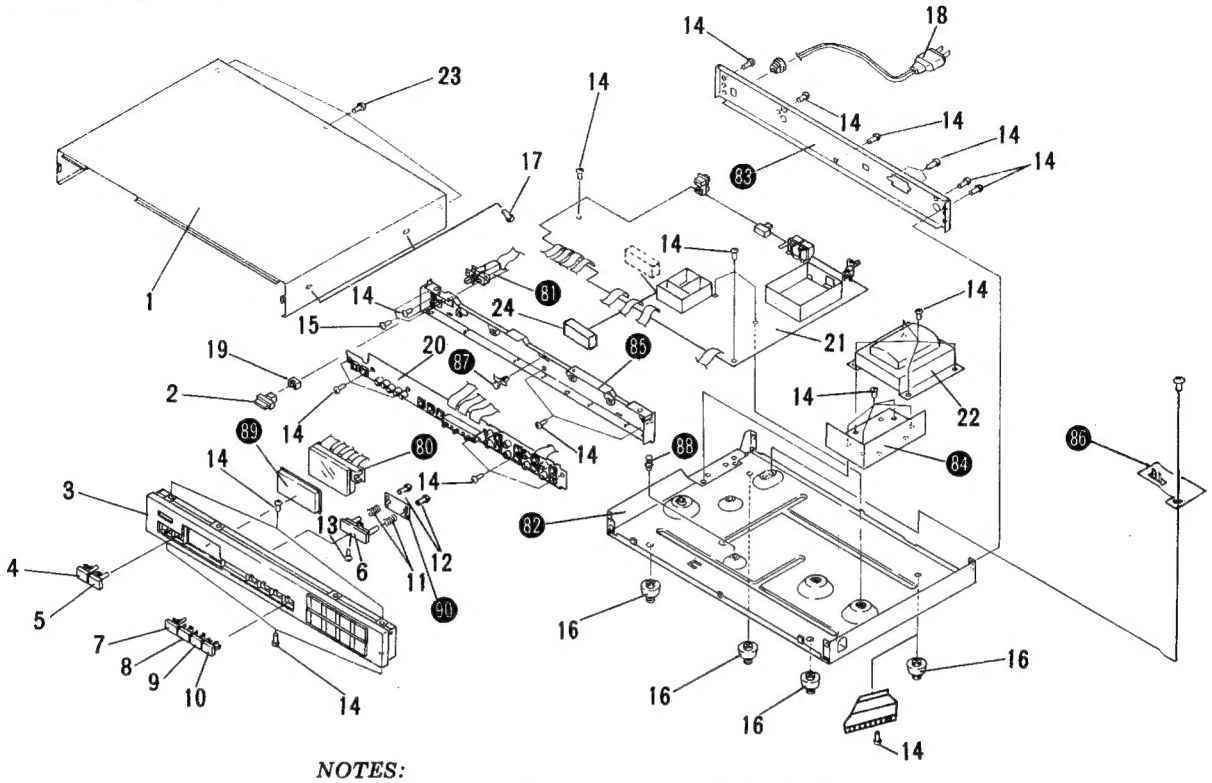
Top View



Rear Panel View



4. EXPLODED VIEW AND PARTS LIST



NOTES:

- ***Parts without part number cannot be supplied.***
- ***The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.***
- ***For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.***
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Parts List

Mark	No.	Part No.	Description
	1.	ANE-537	Bonnet case assembly
	2.	AAD-842	Push knob A (POWER)
	3.	ANM-876	Front panel assembly
	4.	AAD-879	Push knob (FM)
	5.	AAD-880	Push knob (AM)
	6.	AAD-885	Knob (TUNING)
	7.	AAD-881	Push knob (MEM)
	8.	AAY-120	Push knob (MAN)
	9.	AAY-121	Push knob (FM WIDE)
	10.	AAY-122	Push knob (ST, CA)
	11.	ABH-095	Spring
	12.	PTZ26P060FMC	Screw
	13.	ABG-003	Screw
	14.	BBZ30P080FZK	Screw
	15.	VMZ30P060FMC	Screw
	16.	AEP-280	Leg assembly
	17.	AEP-211	rivet
⚠	18.	ADG-073	Power cord
	19.	AEC-743	Flexible ring
	20.	GWY-225	LED assembly A
	21.	GWM-417	Tuner assembly
⚠ ★	22.	ATS-185	Power transformer
	23.	BBT30P080FZK	Screw
	24.	AEB-278	Rubber
	80.		LED assembly B
	81.		Switch assembly
	82.		Chassis
	83.		Rear Panel
	84.		Transformer frame
	85.		Front stay
	86.		Power assembly
	87.		Print spacer
	88.		Spacer
	89.		Display cover
	90.		Spacer

5. ELECTRICAL PARTS LIST

NOTES:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*
  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560Ω	*56 × 10¹*	*561 .....*	*RD¼PS 5 6 1 J*
47kΩ	*47 × 10³*	*473 .....*	*RD¼PS 4 7 3 J*
0.5Ω	*0R5 .....*		*RN2H 0 R 5 K*
1Ω	*010 .....*		*RS1P 0 1 0 K*

  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	*562 × 10¹*	*5621 ....*	*RN¼SR 5 6 2 1 F*

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★ .*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

Miscellaneous Parts

Mark	Symbol & Description		Part No.
		Tuner assembly	GWM-417
		LED assembly A	GWY-225
		LED assembly B	Non supply
		Switch assembly	Non supply
		Power assembly	Non supply
⚠ ★	T801	Power transformer	ATS-185
		Power cord	ADG-073
	C46		CKDYF103Z50

Tunner Assembly (GWM-417)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC101, IC102	μPC1163H
★★	IC103	PA5008
★★	IC201	LA1247
★★	IC401	PA5006
★★	IC402	μPC4050BC
★★	IC403	PA5007
★★	IC404	M5218P
★★	IC501	TD6301AP
★★	IC502	TD6104P
★★	IC503	TC9157AP
★★	IC504	μPD4001BC
★★	Q1	P001
★★	Q2	2SK161
★★	Q3, Q101, Q301 – Q304, Q205	2SC2668
	Q4	2SK241
★★	Q5, Q6	2SC2786
★★	Q201, Q403, Q404, Q503, Q604, Q608	2SK246
★★	Q204, Q206, Q407, Q402, Q502, Q504 – Q508, Q510, Q511, Q514 – Q516, Q518, Q521, Q602, Q603, Q606, Q607	2SC2603
★★	Q501, Q509, Q513	2SA1115
★★	Q512	2SB560
⚠ ★★	Q601, Q605	2SB834
★	D1	KV1320A
★	D5	RD7.5EB
★	D6, D101, D103 – D109, D401 D501 – D504, D506 – D511, D513, D516, D519 – D523, D526, D527, D530, D601, D603, D604, D619	1S1555
★	D102	1SS85
★	D201	KV1226
★	D403, D607 – D609	KZL083
★	D505, D518	AEL-437
★	D602	KZL061
★	D605	RD5.1EB
★	D606	RD3.3EB
★	D612	RD15EB
⚠ ★	D613 – D618	10DFZF
★	TH101, TH401	TH103-2

TRANSFORMERS, COILS AND FILTERS

Mark	Symbol & Description	Part No.
	T1 FM RF transformer	ATC-204
	T2 FM IF transformer	ATE-066
	T3 FM balun transformer	ATC-218
	T101, T102 FM coupling transformer	ATE-063
	T103 FM detector transformer	ATE-060
	T201 AM antenna transformer	ATB-087
	T301 FM coupling transformer	ATE-061
	T302 FM coupling transformer	ATE-062
	L1 FM ANT coil	ATC-224
	L2 Inductor	ATH-093
	L3 FM trancking coil	ATC-223
	L4 FM OSC coil	ATC-077
	L5 FM RF coil	ATC-205
	L101 – L106 Inductor	ATH-090
	L107, L301 – L302 Inductor	ATH-049
	L201 Inductor	ATH-050
	L304, L305 Inductor	ATH-092
	L306 Inductor	ATH-077
	L202 AM OSC coil	ATB-073
	L203 AM DET coil	ATB-091
	L401 19kHz coil	ATM-028
	L402 38kHz coil	ATM-026
	L403, L303 Inductor	ATH-098
	L405 42kHz trap coil	ATM-027
	F105 FM ceramic filter	ATF-107
	F102, F103, F106 – F109 FM ceramic filter	ATF-139
	F104, F101 FM ceramic filter	ATF-119
	F201 AM ceramic filter	ATF-138

CAPACITORS

Mark	Symbol & Description	Part No.
	TC1 – TC3 Ceramic trimmer	ACM-018
	TC201, TC202 Ceramic trimmer	ACM-019
	C447 (390p/50V)	ACG-023
	C1 – C3, C27, C33, C34, C41, C43, C45, C102, C112, C118, C306, C456, C529 (0.01/25V)	ACG-036
	C39, C101, C103, C105, C106, C111, C113, C115, C120, C121, C302 – C305, C312, C313, C319, C402, C408 – C410, C414, C3418	ACG-037
	C301, C304 (0.047/25V)	ACG-038
	C9, C18	CCDCH010C50
	C28, C35, C36, C233	CCDCH030C50
	C132, C133	CCDCH050C50
	C449	CCDCH120J50
	C20	CCDCH150J50
	C457	CCDCH080D50
	C507, C508	CCDCH180J50
	C308	CCDCH220J50
	C21, C315	CCDCH330J50
	C6	CCDCH470J50
	C316	CCDCH820J50
	C37, C38	CCDRH101J50
	C4, C5	CCDSH050C50
	C12, C13, C15, C16	CCDSH150J50
	C24	CCDSH120J50
	C310, C606, C533, C534	CCDSL101J50
	C23	CCDSH330J50
	C126, C127, C309, C516	CCDSL181J50
	C14	CCDSL820J50
	C22	CCDTH080D50
	C204	CCDUJ100D50
	C17	CCPCH150J50
	C413	CCPCH330J50
	C425, C426	CEXANP3R3M50
	C222, C225	CQMA473J50
	C502	CEAR47M50L
	C201, C206, C509, C513 – C515 C520, C527, C528	CEA010M50L
	C446	CEA1R5M50L
	C116, C207, C302, C405, C445, C451, C452, C519	CEA100M50L
	C501	CEA101M35L
	C26, C455	CEA2R2M50L
	C122, C411, C415, C443, C453, C504, C604	CEA220M25L
	C30	CEA221M16L
	C611	CEA221M50L
	C420	CEYA222M16
	C505	CEA222M6L
	C212, C216	CEA330M16L
	C130, C215, C217, C517, C518	CEA4R7M50L
	C129, C412, C422, C602	CEA470M10L
	C610	CEA47M35L
	C448	CEA6R8M50L
	C401, C454	CEYA102M16
	C431, C432, C439, C440, C441, C442	CEXA4R7M50
	C612	CEXA470M25
	C608	CEYA222M16
	C321	CCDSL470J50
	C607	CEA102M35L
	C421, C609	CEA222M16L
	C605	CEYA101M50
	C420	CEYA222M16
	C210, C219, C307	CKDYB102K50
	C7 – C11, C19, C31, C32, C40, C42, C44, C123 – C125, C206, C209, C213, C218, C229, C512, C532	CKDYF103Z50
	C123 – C125, C206, C209, C213, C218, C512, C531	CKDYF103Z50
	C25, C29, C107 – C109, C117, C220,	CKDYF223Z50

Mark	Symbol & Description	Part No.
	C227, C228, C231, C232, C311, C510	
	C202, C203, C211, C214, C230, C506	CKDYF473Z50
	C104, C114, C119, C128	CKDYX473M25
	C110, C208, C511, C530	CKPYX103N25
	C221, C503	CQMA103J50
	C222, C225	CQMA473J50
	C429, C430	CQPA103J50 (CQSA103J50)
	C427, C428	CQSA102J50
	C317	CQSA121J50
	C318	CQSA151J50
	C407, C416	CQSA152J50
	C437, C438	CQSA182J50
	C423, C424	CQSA222J50
	C433, C434	CQSA272J50
	C406, C417	CQSA332J50
	C205	CQSA431J50
	C435, C436	CQSA472J50
	C450	CQSA682J50
	C444	CQSA821J50
	C603	CQSXA101J160

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
★	VR101 Semi-fixed	VRTB6VS103
★	VR401 Semi-fixed	VRTB6VS222
★	VR405 Semi-fixed	VRTB6VS223
★	VR402 – VR404 Semi-fixed	VRTS6VS222
	R453 Carbon composition	ACN-145
⚠	R238	RS2LMF221J
⚠	R606	RD1/2PM102J
	R28, R123	RD1/2PM □□□J
	R402, R403, R424, R425, R450, R601, R602	RN1/4PQ □□□F
	R20, R27, R102 – R117, R119 – R122, R124 – R126, R128 – R137, R304, R307, R309 – R311, R316, R455, R513 – R534, R542, R543, R546 – R548, R575, R589, R590, R595, R603, R604, R608 – R611	RD1/8PM □□□J
	Other resistors	RD1/4PM □□□J

OTHERS

Mark	Symbol & Description	Part No.
	X501 Crystal resonator	ASS-025
	X301 Crystal resonator	ASS-026
	X201 Ceramic resonator	ATF-125
	Terminal (AM STEREO OUT)	AKB-097
	Terminal (OUTPUT)	AKB-119
	Terminal (AM ANT)	AKE-060
	F-type connector (FM ANT)	AKX-081
	Screw	PBZ30P060FMC

LED Assembly A (GWY-225)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D703 – D705, D708 – D711 LED	AEL-383
★	D702 LED	AEL-386
★	D706, D714 – D721 LED	AEL-388
★	D707 LED	AEL-455
★	D713	1S1555

SWITCHES

Mark	Symbol & Description	Part No.
★★	S601 – S605, S607 – S614 Tact switch	ASG-705
★★	S606 Push switch	SEA8V222S

RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Symbol & Description	Part No.
	R701 – R707	RD1/4PM □□□J

LED Assembly B

Mark	Symbol & Description	Part No.
★	D701 LED	AEL-444
	R708 – R711	RD1/8PM820J

Switch Assembly

Mark	Symbol & Description	Part No.
⚠ ★★	S615 Push switch (POWER)	ASG-547

Power Assembly

Mark	Symbol & Description	Part No.
⚠	R901	ACN-209

6. ADJUSTMENTS

AM Section Adjustments

- Wire as shown in Fig. 6-1.
- Set the AM key to ON,

Step	AM SG (400Hz, 30% modulation)		F-99X frequency indication	Adjustments	
	Frequency	Level		Adjustment point	Standard
1	No signal		530kHz	L202	Adjust so that the voltage between terminal 16 and ground is 2V (±0.3V).
2			1,600kHz	TC202	Adjust so that the voltage between terminal 16 and ground is 24.5V (±0.2V).
3	Repeat steps 1 and 2 until both ground voltage standards are satisfied.				
4	600kHz	50 – 80dB	600kHz	T201	Maximize the voltage between terminal 11 and ground.
5	1,400kHz	50 – 80dB	1,400kHz	TC201	
6	Repeat steps 4 and 5 until the maximum voltage standard is satisfied in both steps.				

FM Section Adjustment

- Wire as shown in Fig. 6-2.
- Set the FM key to ON, the FM-WIDE keys to OFF.

Step	FM SG (400Hz, ± 75kHz deviation)		F-99X frequency indication	Adjustments	
	Frequency	Level		Adjustment point	Standard
1	No signal		108MHz	L4	Adjust so that the voltage between terminal 16 and ground is 24.5V (±0.2V).
2			87.5MHz	. . .	Confirm that the voltage between terminal 16 and ground is 8V (±0.5V).
3	90MHz	40dB	90MHz	L1, T1, L5	Maximize the voltage between terminal 22 and ground.
4	106MHz	40dB	106MHz	TC1 – 3	
5	Repeat steps 3 and 4 until the voltage at terminal 11 is as high as possible.				
6	Set the FM-WIDE keys to on and the muting key to on.				
7	98MHz	40dB	98MHz	T2, T101, T102	Adjust so that the voltage between terminal 22 and ground is maximized.
8	98MHz	40dB	98MHz	T103	Adjust so that the DC voltage between terminals 12 and 13 is zero.
9	98MHz	40dB	98MHz	VR401	Adjust so that the DC voltage between terminals 8 and 9 is zero.
10	98MHz	Pilot modulation	98MHz	VR405, L401	Repeatedly adjust until the carrier leak output is as small as possible.

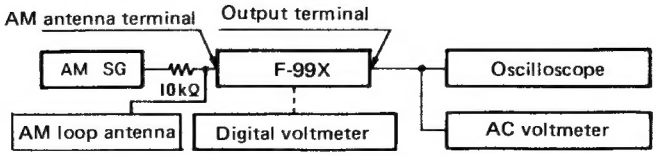


Fig. 6-1 AM adjustment wiring diagram

MPX Section Adjustments

- Set the FM key to ON, the FM-WIDE key to ON (WIDE), the MANUAL/MUTE OFF key to OFF.
- Set the FM SG modulation mode to the EXT mode and connect the MPX SG to the FM SG EXT mode terminal.
- Set the FM SG output to 98MHz (precisely) and then set the tuned frequency of the F-99X to 98MHz.

Step	MPX SG modulation mode	FM SG level	Adjustments	
			Adjustment point	Standard
1	Modulation output off	60dB	VR404	Adjust so that the output frequency between terminal 10 and ground is 38kHz (±100Hz).
2	Standard stereo modulation	95dB	T2, T101, T102	Adjust so that distortion at the output terminal is minimized.
3	Standard stereo modulation, main signal on L	80dB	VR402	Adjust so that the R channel output at the output terminal is minimized.
4	Standard stereo modulation, main signal on R	80dB	VR403	Adjust so that the L channel output at the output terminal is minimized.
5	Pilot signal (19kHz) only	80dB	VR405	Balance and minimize the 19kHz leak for both the L and R channels at the output terminal.
6	Set the FM and IF-WIDE keys to off.			
7	Standard stereo modulation	26dB	VR101	Adjust to the point just before muting is applied.

Note:
Standard stereo modulation is 1kHz (L+R) ± 67.5kHz devi. for the main signal and ± 7.5kHz devi. for the pilot signal (19kHz).

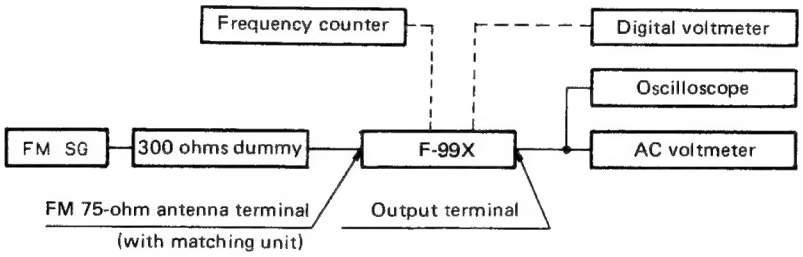


Fig. 6-2 FM adjustment wiring diagram

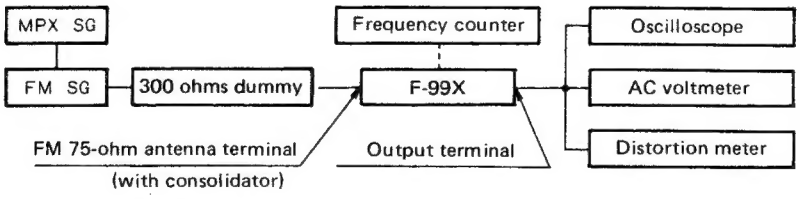


Fig. 6-3 FM MPX adjustment wiring diagram

Adjustment points	Adjustment names
L4	FM, VT adjustment
L1, T1, L5, TC1 ~ 3	FM ANT · FM RF
T2, T101, T102	IFT peak adjustment
T103 · VR401	Center adjustment
VR405 · L401	Pilot cancel
VR404	VCO
VR402, VR403	FM separation
VR101	Muting level
L202, TC202	AM, VT adjustment
T201, TC201	AM, ANT

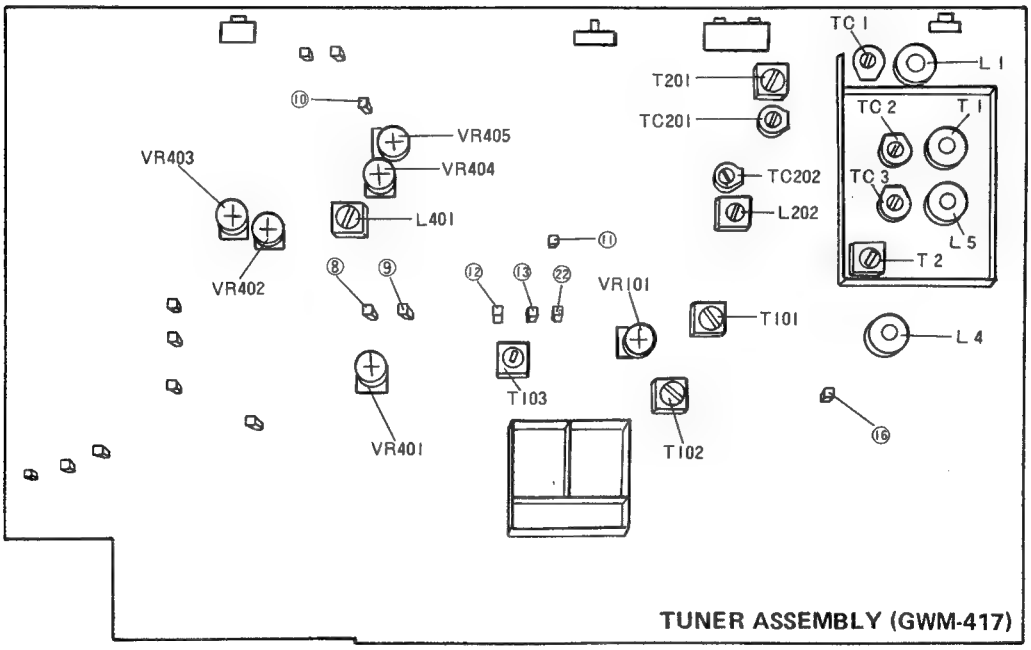


Fig. 6-4 Adjustment point

6. RÉGLAGE

Réglages de la Section AM

- Effectuer le câblage comme indiqué sur la figure 6-1.
- Placer la touche AM sur la position ON (marche).

Etape	AM SG (400Hz, 30% de modulation)		F-99X indication de fréquence	Réglages	
	Fréquence	Niveau		Point de réglage	Norme
1	Aucun signal		530kHz	L202	Régler de telle manière que la tension entre la borne 16 et la terre soit égale à 2V (±0,3V).
2			1.600kHz	TC202	Régler de telle manière que la tension entre la borne 16 et la terre soit égale à 24,5V (±0,2V).
3	Répéter les étapes 1 et 2 jusqu'à ce que les deux normes de tension de terre soient satisfaites.				
4	600kHz	50 – 80dB	600kHz	T201	Régler de telle manière que la tension entre la borne 11 et la terre soit au maximum.
5	1.400kHz	50 – 80dB	1.400kHz	TC201	
6	Répéter les étapes 4 et 5 jusqu'à ce que la norme de tension maximum soit satisfaire dans les deux étapes.				

Réglage de la Section FM

- Effectuer le câblage comme indiqué dans la figure 6-2.
- Régler la touche FM sur la position ON (marche), et les touches FM-WIDE sur la position OFF (arrêt).

Etape	FM SG (400Hz, ±75kHz de déviation)		Indication de fréquence de F-99X	Réglages	
	Fréquence	Niveau		Point de réglage	Norme
1	Aucun signal		108MHz	L4	Régler de telle manière que la tension entre la borne 16 et la terre soit égale à 24,5V (±0,2V).
2			87,5MHz	. . .	Vérifier si la tension entre la borne 16 et la terre est égale à 8V (± 0,5V).
3	90MHz	40dB	90MHz	L1, T1, L5	Régler de telle manière que la tension entre la borne 22 et la terre soit au maximum.
4	106MHz	40dB	106MHz	TC1 – 3	
5	Répéter les étapes 3 et 4 jusqu'à ce que la tension à la borne 11 soit maximum autant que possible.				
6	Régler les touches FM-WIDE et de blocage sur la position ON (marche).				
7	98MHz	40dB	98MHz	T2, T101, T102	Régler de telle manière que la tension entre la borne 22 et la terre soit au maximum.
8	98MHz	40dB	98MHz	T103	Régler de telle manière que la tension de CC entre les bornes 12 et 13 soit égale à zéro.
9	98MHz	40dB	98MHz	VR401	Régler de telle manière que la tension de CC entre les borne 8 et 9 soit égale à zéro.
10	98MHz	Modulation pilote	98MHz	VR405, L401	Régler plusieurs fois jusqu'à ce que la sortie de fuite de la porteuse soit au minimum autant que possible.

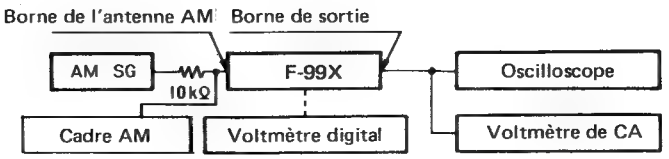


Fig. 6-1 Diagramme de câblage de réglage FM

Réglages de la Section MPX

- Régler la touche FM sur la position ON (marche), la touche FM-WIDE sur la position ON (WIDE) et la touche MANUAL/MUTE OFF sur la position OFF (arrêt).
- Régler le mode de modulation FM SG sur la position EXT et brancher MPX SG à la borne de mode FM SG EXT.
- Régler la sortie FM SG sur 98MHz (avec précision), puis régler la fréquence accordée de F-99X 98MHz.

Etape	Mode de modulation MPX SG	Niveau FM SG	Réglages	
			Point de réglage	Norme
1	Interruption de sortie de modulation.	60dB	VR404	Régler de telle meanière que la fréquence de sortie entre la borne 10 et la terre sait égale à 38kHz (± 100Hz).
2	Modulation stéréophonique standard.	95dB	T2, T101, T102	Régler de telle manière que la distorsion à la borne de sortie soit au minimum.
3	Modulation stéréophonique standard, signal principal sur L (gauche).	80dB	VR402	Régler de telle manière que la sortie du canal de droite (R) à la borne de sortie soit au minimum.
4	Modulation stéréophonique standard, signal principal sur R (droite).	80dB	VR403	Régler de telle manière que la sortie du canal de gauche (L) soit au minimum.
5	Signal pilote (19kHz) seulement.	80dB	VR405	Equilibrer et minimiser la fuite de 19kHz pour les deux canaux de gauche et de droite (L et R) à la borne de sortie.
6	Régler les touches FM et IF-WIDE sur la position OFF (arrêt).			
7	Modulation stéréophonique standard.	26dB	VR101	Régler sur le point juste avant d'appliquer le blocage (muting).

Note:
La modulation stéréophonique standard est de 1kHz (L+R, gauche + droite) ±67,5 de déviation pour le signal principal et ±7,5kHz de déviation pour le signal pilote (19kHz).

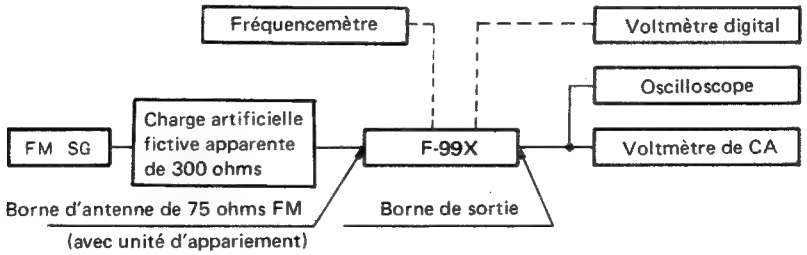
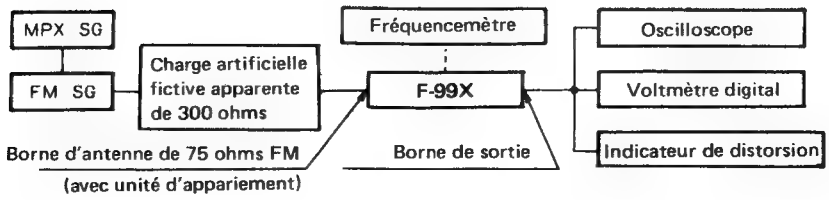


Fig. 6-2 Diagramme de câblage de réglage FM



Point de réglage	Désignation de réglages
L4	Réglage FM, VT
L1, T1, L5, TC1 ~ 3	FM ANT · FM RF
T2, T101, T102	Réglage de crête IFT
T103 · VR401	Réglage de centre
VR405 · L401	Annulation pilote
VR404	VCO
VR402, VR403	Séparation FM
VR101	Niveau de blocage (muting)
L202, TC202	Réglage AM, VT
T201, TC201	AM, ANT

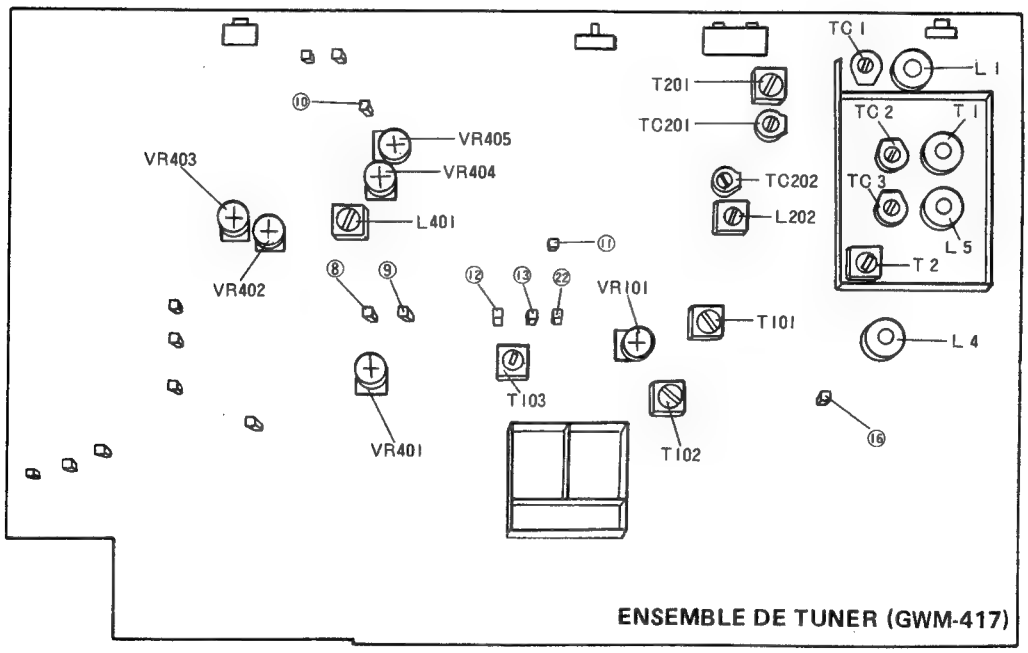


Fig. 6-4 Point the réglage

6. AJUSTE

Ajustes de la Sección AM

- Ejecutar el alambrado como se muestra en la figura 6-1.
- Colocar la tecla AM en la posición ON (encendido).

Paso	AM SG (400Hz, 30% de modulación)		F-99X indicación de frecuencia	Ajustes	
	Frecuencia	Nivel		Punto de ajuste	Estándar
1	Ninguna señal		530kHz	L202	Ajustar de modo que el voltaje entre el terminal 16 y la tierra sea de 24,5V ± 0,2V).
2			1.600kHz	TC202	Ajustar de modo que el voltaje entre el terminal 16 y la tierra sea de 24,5V (± 0,2V).
3	Repetir los pasos 1 y 2 hasta que ambos estándares de voltaje de tierra sean satisfechos.				
4	600kHz	50 – 80dB	600kHz	T201	Ajustar de modo que el voltaje entre el terminal 11 y la tierra sea máximo.
5	1.400kHz	50 – 80dB	1.400kHz	TC201	
6	Repetir los pasos 4 y 5 hasta que el estándar de voltaje máximo sea satisfecho en ambos pasos.				

Ajuste de la Sección FM

- Ejecutar el alambrado como se muestra en la figura 6-2.
- Ajustar la tecla FM en la posición ON (encendido), y las teclas FM-WIDE en la posición OFF (parado).

Paso	FM SG (400Hz, ±75kHz de desviación)		Indicación de frecuencia de F-99X	Ajustes	
	Frecuencia	Nivel		Punto de ajuste	Estándar
1	Ninguna señal		108MHz	L4	Ajustar de modo que el voltaje entre el terminal 16 y la tierra sea de 24,5V (± 0,2V).
2			87.5MHz	. . .	Verificar si el voltaje entre el terminal 16 y la tierra es de 8V (± 0,5V).
3	90MHz	40dB	90MHz	L1, T1, L5	Ajustar de modo que el voltaje entre el terminal 22 y la tierra sea máximo.
4	106MHz	40dB	106MHz	TC1 –3	
5	Repetir los pasos 3 y 4 hasta que el voltaje en el terminal 11 sea máximo en lo posible.				
6	Ajustar las teclas FM-WIDE y del silenciador en la posicion ON (encendido).				
7	98MHz	40dB	98MHz	T2, T101, T102	Ajustar de modo que el voltaje entre el terminal 22 y la tierra sea máximo.
8	98MHz	40dB	98MHz	T103	Ajustar de modo que el voltaje CD entre los terminales 12 y 13 sea cero.
9	98MHz	40dB	98MHz	VR401	Ajustar de modo que el voltaje CD entre los terminales 8 y 9 sea cero.
10	98MHz	Modulación piloto	98MHz	VR405, L401	Ajustar varias veces hasta que la salida de fuga de portadora sea mínima en lo posible.

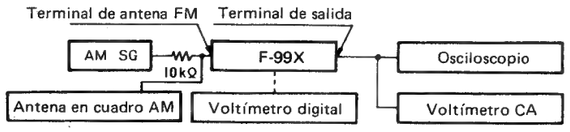


Fig. 6-1 Esquema de alambrado de ajuste AM

Ajustes de la Sección MPX

- Ajustar la tecla FM en la posición ON (encendido), la tecla FM-WIDE en la posición OFF (parado).
- Ajustar el modo de modulación FM SG en la posición EXT y conectar MPX SG al terminal de modo FM SG EXT.
- Ajustar la salida FM SG a 98MHz (con precisión), luego ajustar la frecuencia sintonizada de F-99X a 98MHz.

Paso	Modo de modulación MPX SG	Nivel FM SG	Ajustes	
			Punto de ajuste	Estándar
1	Interrupción de salida de modulación.	60dB	VR404	Ajustar de modo que la frecuencia de salida entre el terminal 10 y la tierra sea de 38kHz (± 100Hz).
2	Modulación estereofónica estándar.	95dB	T2, T101, T102	Ajustar de modo que la distorsión en el terminal de salida sea mínima.
3	Modulación estereofónica estándar, señal principal en L (izquierda).	80dB	VR402	Ajustar de modo que la salida de canal de derecha (R) en el terminal de salida sea mínima.
4	Modulación estereofónica estándar, señal principal en R (derecha).	80dB	VR403	Ajustar de modo que la salida de canal de izquierda (L) sea mínima.
5	Señal piloto (19kHz) solamente.	80dB	VR405	Balancear y minimizar la fuga de 19kHz para ambos los canales de izquierda y derecha (L y R) en el terminal de salida.
6	Ajustar las teclas FM y IF-WIDE en la posición OFF (parado).			
7	Modulación estereofónica estándar.	26dB	VR101	Ajustar al punto un poco antes que el silenciador sea aplicado.

Nota:
La modulación estereofónica estándar es de 1kHz (L i R, Izq. i Der.) ± 67,5 de desviación para la señal principal y ± 7,5kHz de desviación para la señal piloto (19kHz).

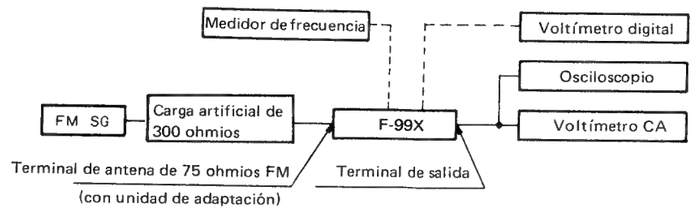


Fig. 6-2 Esquema de alambrado de ajuste FM

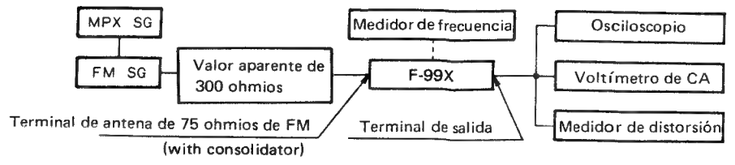


Fig. 6-3 Esquema de alambrado de ajuste FM MPX

Ajustes de la Sección MPX

- Ajustar la tecla FM en la posición ON (encendido), la tecla FM-WIDE en la posición OFF (parado).
- Ajustar el modo de modulación FM SG en la posición EXT y conectar MPX SG al terminal de modo FM SG EXT.
- Ajustar la salida FM SG a 98MHz (con precisión), luego ajustar la frecuencia sintonizada de F-99X a 98MHz.

			Ajustes	
Paso	Modo de modulación MPX SG	Nivel FM SG	Punto de ajuste	Estándar
1	Interrupción de salida de modulación.	60dB	VR404	Ajustar de modo que la frecuencia de salida entre el terminal 10 y la tierra sea de 38kHz (± 100Hz).
2	Modulación estereofónica estándar.	95dB	T2, T101, T102	Ajustar de modo que la distorsión en el terminal de salida sea mínima.
3	Modulación estereofónica estándar, señal principal en L (izquierda).	80dB	VR402	Ajustar de modo que la salida de canal de derecha (R) en el terminal de salida sea mínima.
4	Modulación estereofónica estándar, señal principal en R (derecha).	80dB	VR403	Ajustar de modo que la salida de canal de izquierda (L) sea mínima.
5	Señal piloto (19kHz) solamente.	80dB	VR405	Balancear y minimizar la fuga de 19kHz para ambos los canales de izquierda y derecha (L y R) en el terminal de salida.
6	Ajustar las teclas FM y IF-WIDE en la posición OFF (parado).			
7	Modulación estereofónica estándar.	26dB	VR101	Ajustar al punto un poco antes que el silenciador sea aplicado.

Nota:
La modulación estereofónica estándar es de 1kHz (L i R, Izq. i Der.) ± 67,5 de desviación para la señal principal y ± 7,5kHz de desviación para la señal piloto (19kHz).

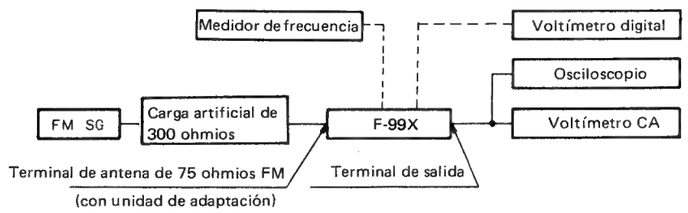


Fig. 6-2 Esquema de alambrado de ajuste FM

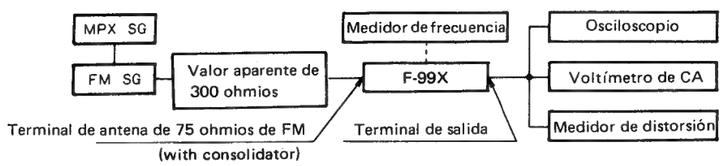


Fig. 6-3 Esquema de alambrado de ajuste FM MPX

Puntos de ajuste	Designaciones de ajustes
L4	Ajuste FM, VT
L1, T1, L5, TC1 ~ 3	FM ANT · FM RF
T2, T101, T102	Ajuste de cresta IFT
T103 · VR401	Ajuste de centro
VR405 · L401	Anulacion piloto
VR404	VCO
VR402, VR403	Separación FM
VR101	Nivel de silenciador
L202, TC202	Ajuste AM, VT
T201, TC201	AM, ANT

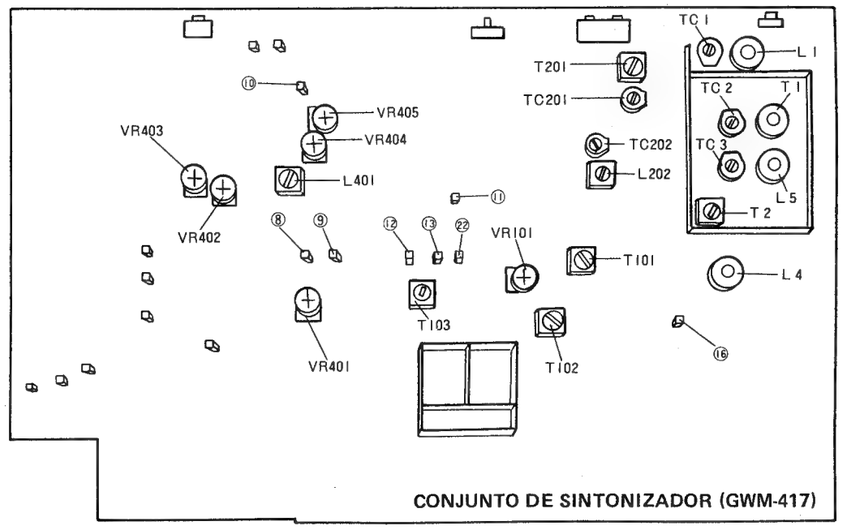
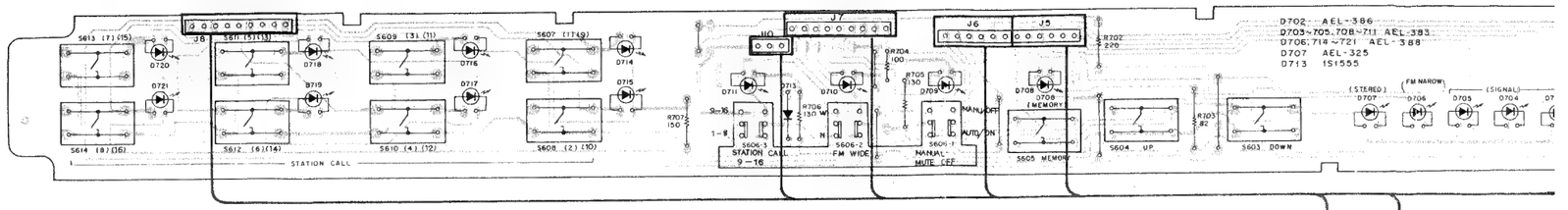
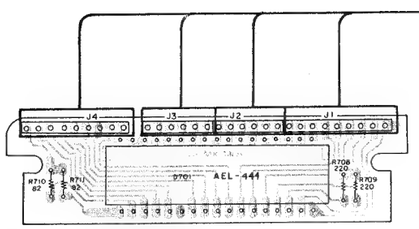


Fig. 6-4 Punto de ajuste

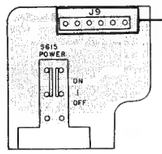
7. P.C. BOARDS CONNECTION DIAGRAM



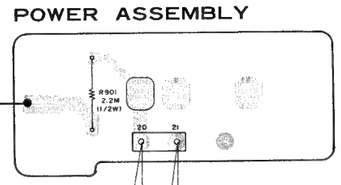


LED ASSEMBLY B

SWITCH ASSEMBLY

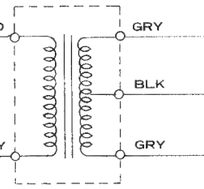


POWER ASSEMBLY

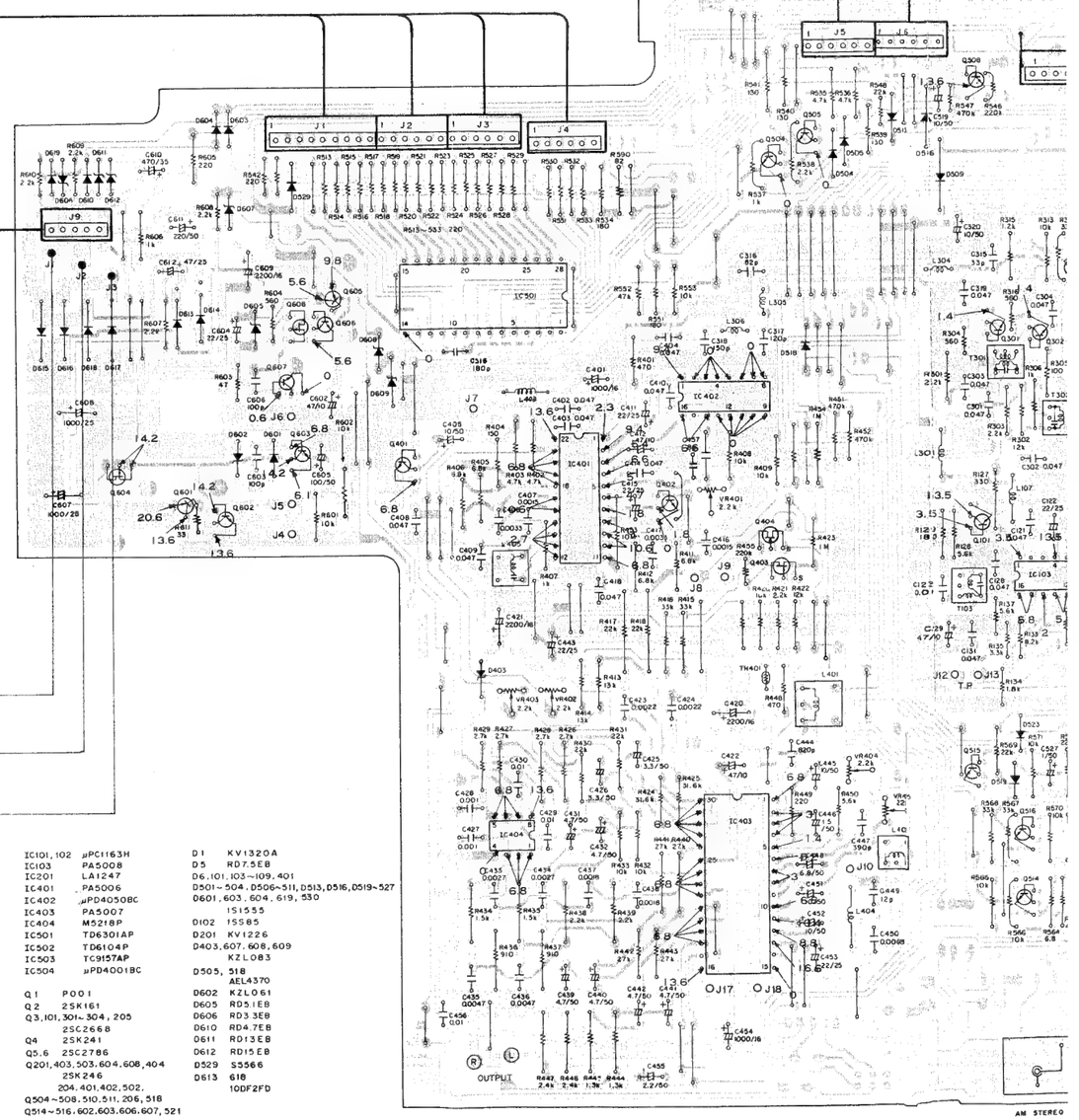


AC120V 60Hz

POWER CORD ADG-073



T801 ATS-185 POWER TRANSFORMER



IC101, 102	μPC1163H	D1	KV1320A
IC103	PA5008	D5	RD7.5EB
IC201	LA1247	D6.101.103~109.401	
IC401	PA5006	D501~504.D506~511.D513.D516.D519~527	
IC402	μPD4050BC	D601.603.604.619.630	
IC403	PA5007		1S1555
IC404	M5218P	D102	1SS85
IC501	TD6301AP	D201	KV1226
IC502	TD6104P	D403.607.608.609	
IC503	TC9157AP		KZL083
IC504	μPD4001BC	D505, 518	
			AEL4370
Q1	P001	D602	KZL061
Q2	2SK161	D605	RD5.1EB
Q3.101.301~304.205		D606	RD3.3EB
	2SC2668	D610	RD4.7EB
Q4	2SK241	D611	RD13EB
Q5.6	2SC2786	D612	RD15EB
Q201.403.503.604.608.404		D529	S5566
	2SK246	D613	618
	204.401.402.502.		10DF2FD
Q504~508.510.511.206.518			
Q514~516.602.603.606.607.521			
	2SC2603		
Q501.509.513			
	2SA1115		
Q512	2SB560		
Q601.605	2SB834		

LED ASSEMBLY A

TUNER ASSEMBLY
(GWM-417)

D702 AEL-386
D703~705,708~711 AEL-383
D706,714~721 AEL-388
D707 AEL-325
D713 1S1555

IC101,102 μPC1163H
IC103 PA5008
IC201 LA1247
IC401 PA5006
IC402 μPD4050BC
IC403 PA5007
IC404 M5218P
IC501 TD6301AP
IC502 TD6104P
IC503 TC9157AP
IC504 μPD4001BC

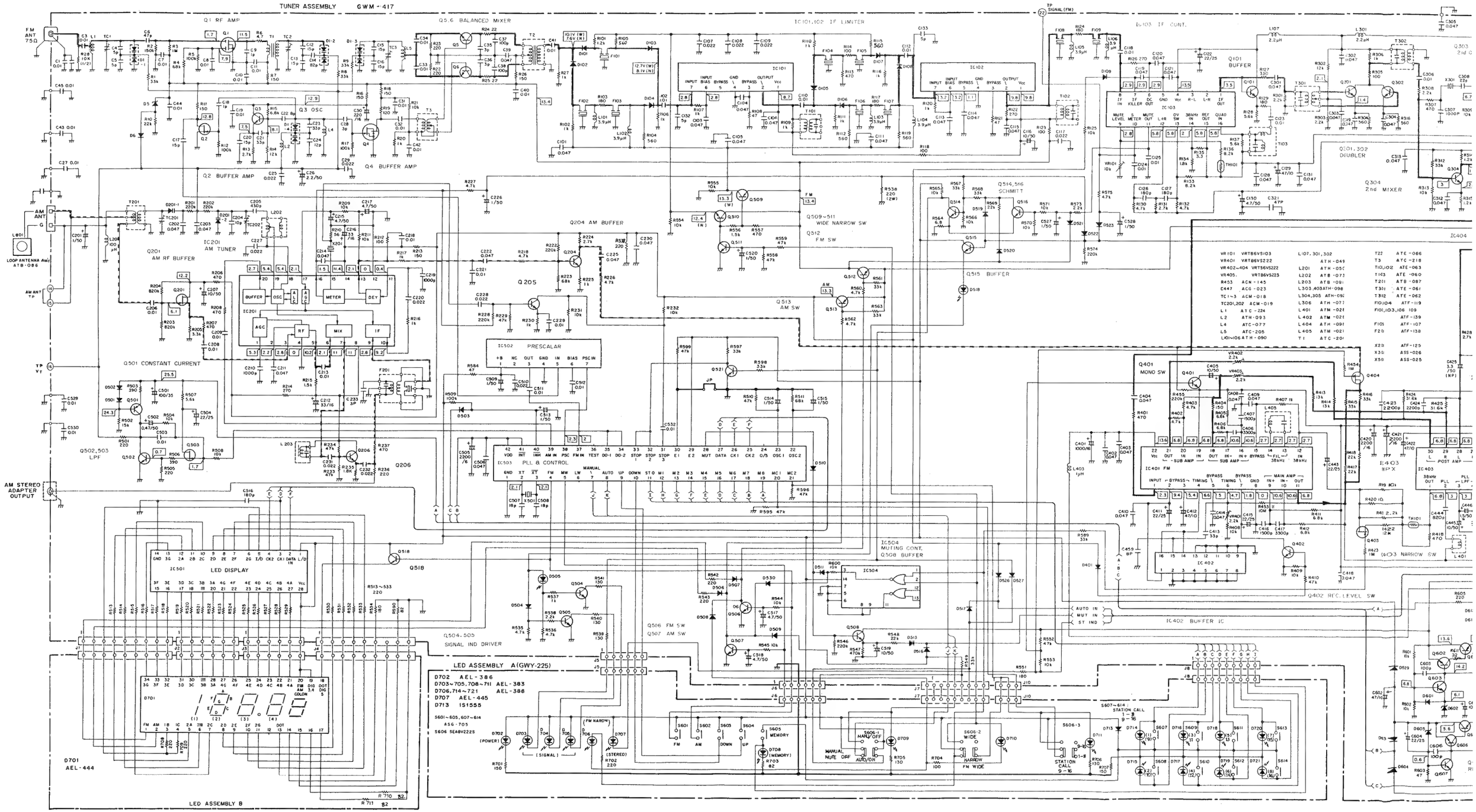
Q1 P001
Q2 2SK161
Q3,101,301~304,205 2SC2668
Q4 2SK241
Q5,6 2SC2786
Q201,403,503,604,608,404 2SK246
204,401,402,502,
Q504~508,510,511,206,518
Q514~516,602,603,606,607,521 2SC2603
Q501,509,513 2SA1115
Q512 2SB560
Q601,605 2SB834

D1 KV1320A
D5 RD7.5EB
D6,101,103~109,401 1S2076A
D501~504,D506~511,D513,D516,D519~527 AEL4370
D601,603,604,619,530 KZL061
1S1555
D102 1SS85
D201 KV1226
D403,607,608,609 KZL083
D505,518 AEL4370
D602 KZL061
D605 RD5.1EB
D606 RD3.3EB
D610 RD4.7EB
D611 RD13EB
D612 RD15EB
D529 S5566
D613 618
10DF2FD

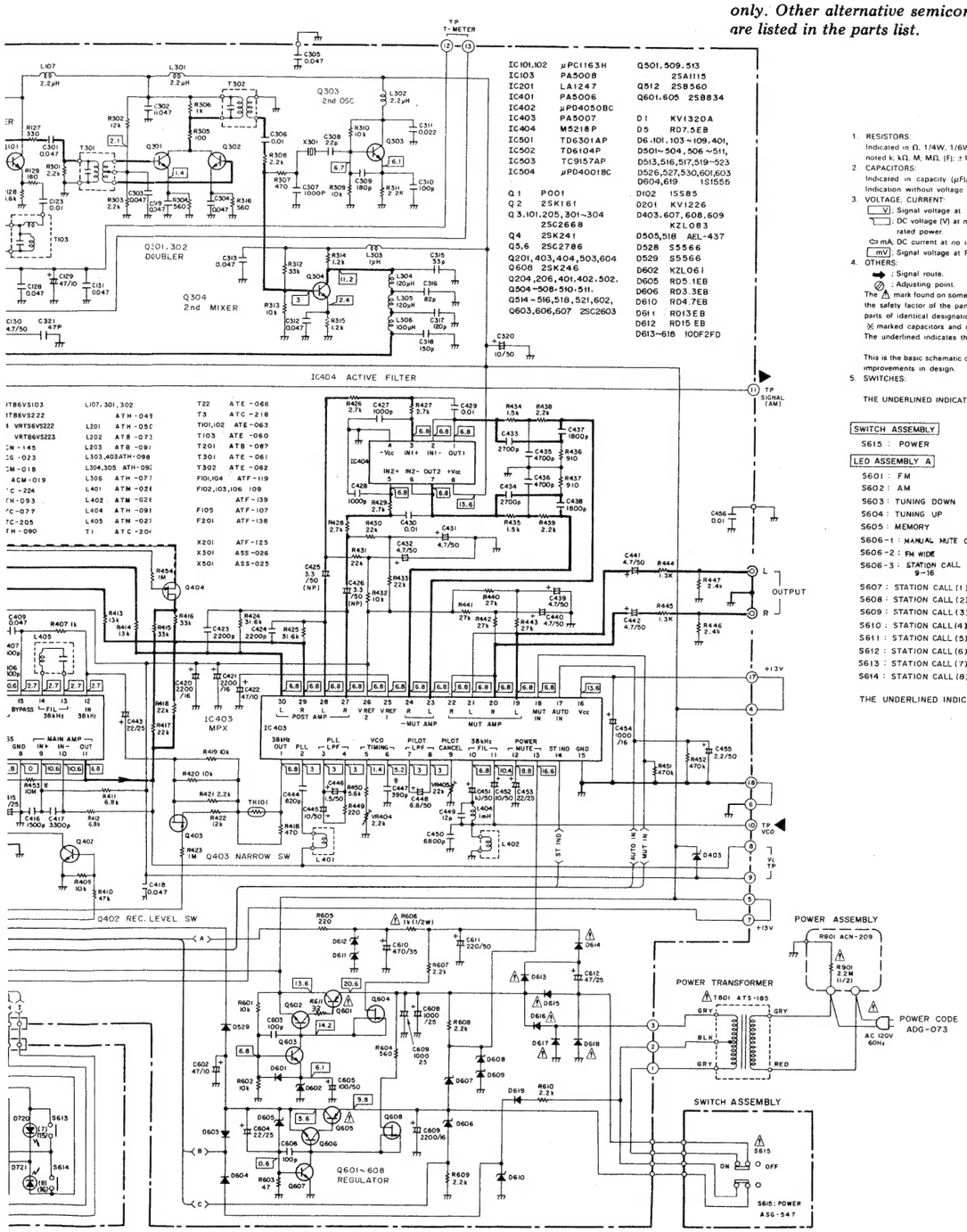
L801
LOOP ANTENNA
Ass'y
ATB-086

OUTPUT
AM STEREO
FM ANT

8. SCHEMATIC DIAGRAM



NOTE:
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



IC101,102	μPC1163H	Q501,509,513	
IC103	PA5008		2SA1115
IC201	LA1247	Q512	2S8560
IC401	PA5006	Q601,605	2S8834
IC402	μPD4050BC		
IC403	PA5007	D1	KV1320A
IC404	M5218P	D5	RD7.5EB
IC501	TD6301AP	D6-101,103~109,401,	
IC502	TD6104P	D501~504,506~511,	
IC503	TC9157AP	D513,516,517,519~523	
IC504	μPD4001BC	D526,527,530,601,603	
		D604,619	1S1555
Q1	P001	D102	1S585
Q2	2SK161	D201	KV1226
Q3,101,205,301~304	2SC2668	D403,607,608,609	KZL083
Q4	2SK241	D505,518	AEL-437
Q5,6	2SC2786	D528	S5566
Q201,403,404,503,604		D529	S5566
Q608	2SK246	D602	KZL061
Q204,206,401,402,502,		D605	RD5.1EB
Q504~508,510~511,		D606	RD3.3EB
Q514~516,518,521,602,		D610	RD4.7EB
Q603,606,607	2SC2603	D611	RD13EB
		D612	RD15 EB
		D613~618	10DF2FD

1. RESISTORS:
Indicated in Ω, 1/4W, 1/6W and 1/8W, ±5% tolerance unless otherwise noted k: kΩ, M: MΩ. (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% tolerance
2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p: pF. Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE, CURRENT:
V: Signal voltage at W +, W, 8Ω output (1 kHz)
V: DC voltage (V) at no input signal Value in ( ) is DC voltage at rated power.
mA: DC current at no input signal
mV: Signal voltage at FM 400 Hz ± 75 kHz DEV.
4. OTHERS:
➡ : Signal route.
⊘ : Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts unmbers.
The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES:

THE UNDERLINED INDICATES THE SWITCH POSITION

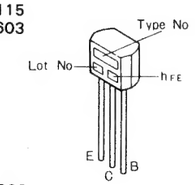
SWITCH ASSEMBLY
S615 : POWER — ON — OFF

LED ASSEMBLY A
S601 : FM — ON — OFF
S602 : AM — ON — OFF
S603 : TUNING DOWN — ON — OFF
S604 : TUNING UP — ON — OFF
S605 : MEMORY — ON — OFF
S606-1 : MANUAL MUTE OFF MANUAL/OFF — AUTO/ON
S606-2 : FM WIDE — FM IF WIDE — NARROW
S606-3 : STATION CALL 9-16 — STATION CALL 9-16 — 1-8
S607 : STATION CALL (1 9) ON — OFF
S608 : STATION CALL (2 10) ON — OFF
S609 : STATION CALL (3 11) ON — OFF
S610 : STATION CALL (4 12) ON — OFF
S611 : STATION CALL (5 13) ON — OFF
S612 : STATION CALL (6 14) ON — OFF
S613 : STATION CALL (7 15) ON — OFF
S614 : STATION CALL (8 16) ON — OFF

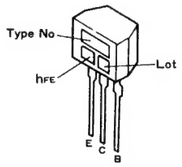
THE UNDERLINED INDICATES THE SWITCH POSITION

External Appearance of Transistors and ICs

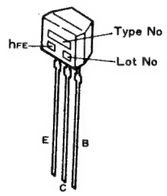
2SA1115
2SC2603



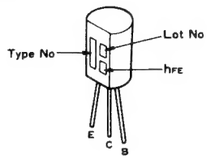
2SC2668



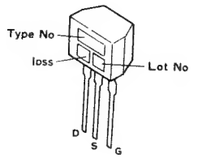
2SC2786



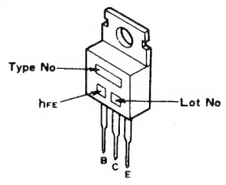
2SB560



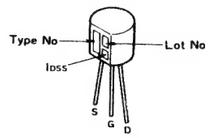
2SK161
2SK241



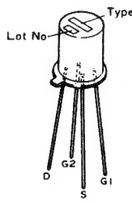
2SB834



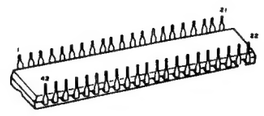
2SK246



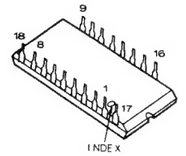
P001



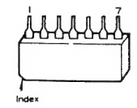
TC9157AP



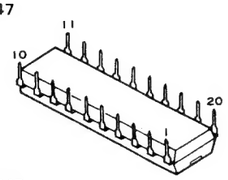
PA3007-A



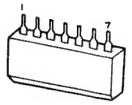
μPC1163H



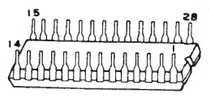
LA1247



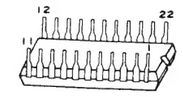
TD6104P



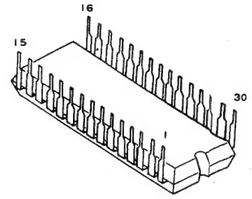
TD6301AP



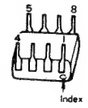
PA5006



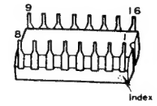
PA5007



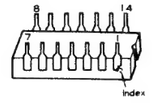
M5218P



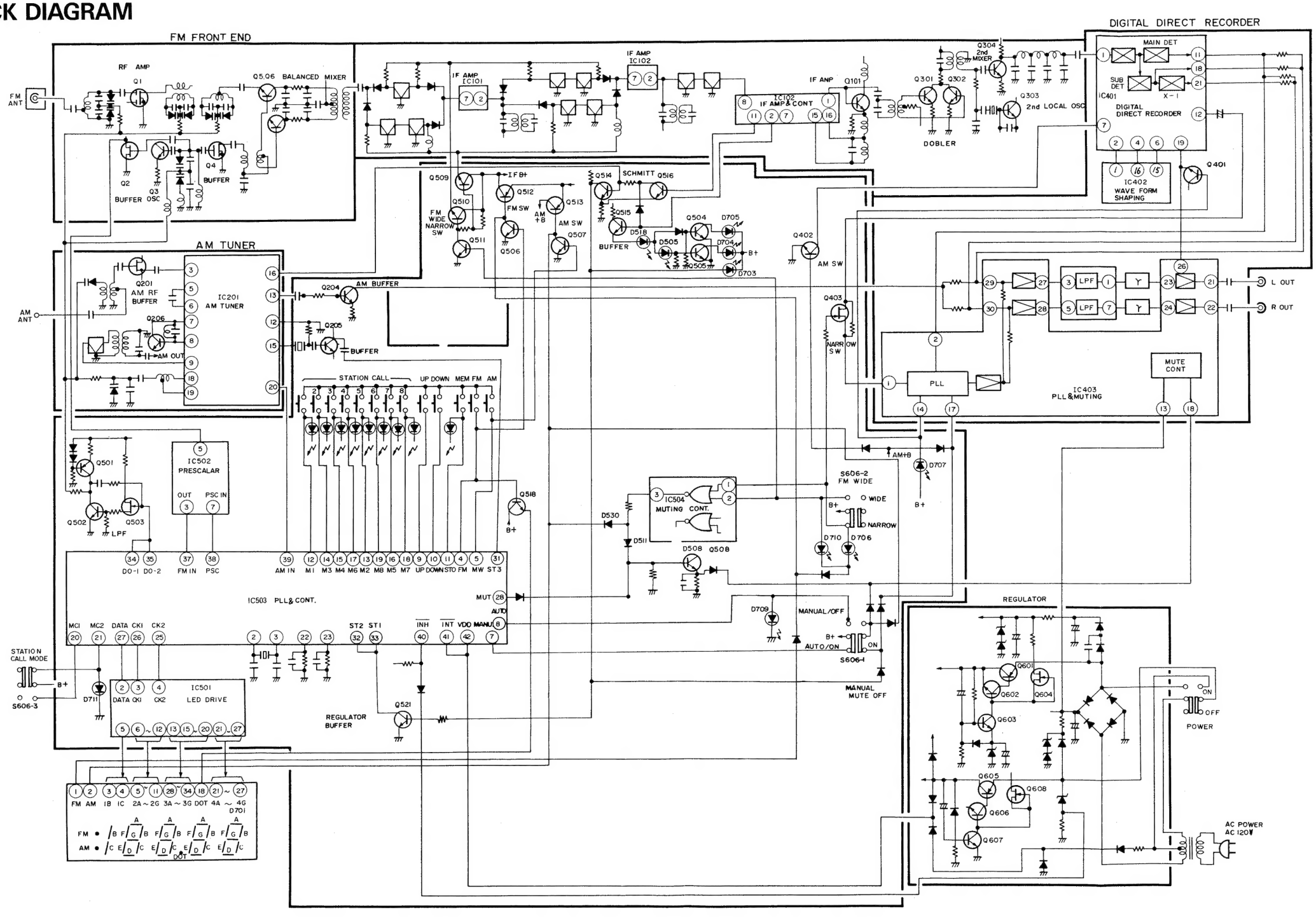
PA5008
μPD4050BC



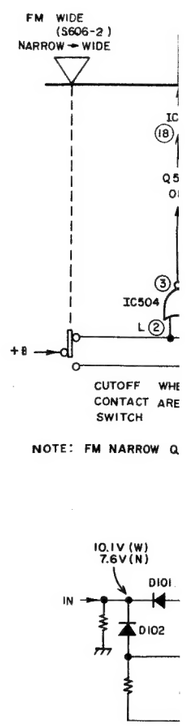
μ PD4001BC



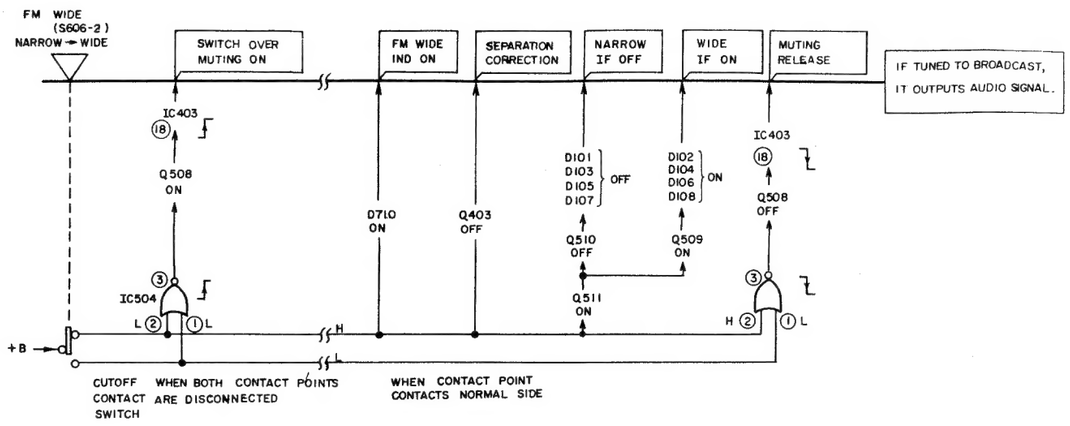
9. BLOCK DIAGRAM



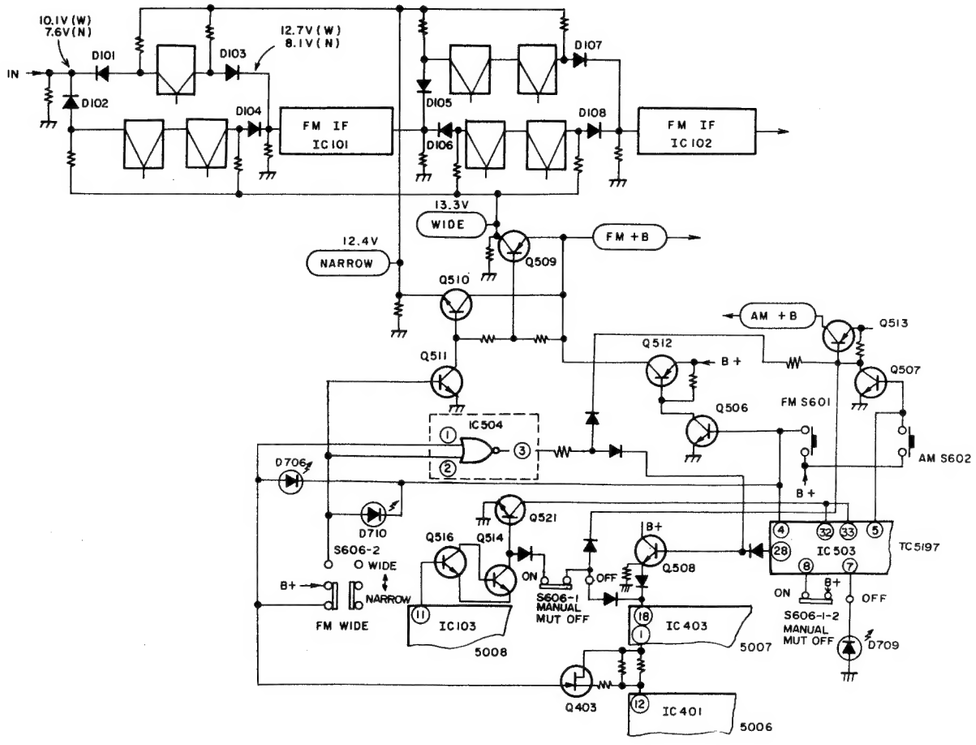
10. CIRCU



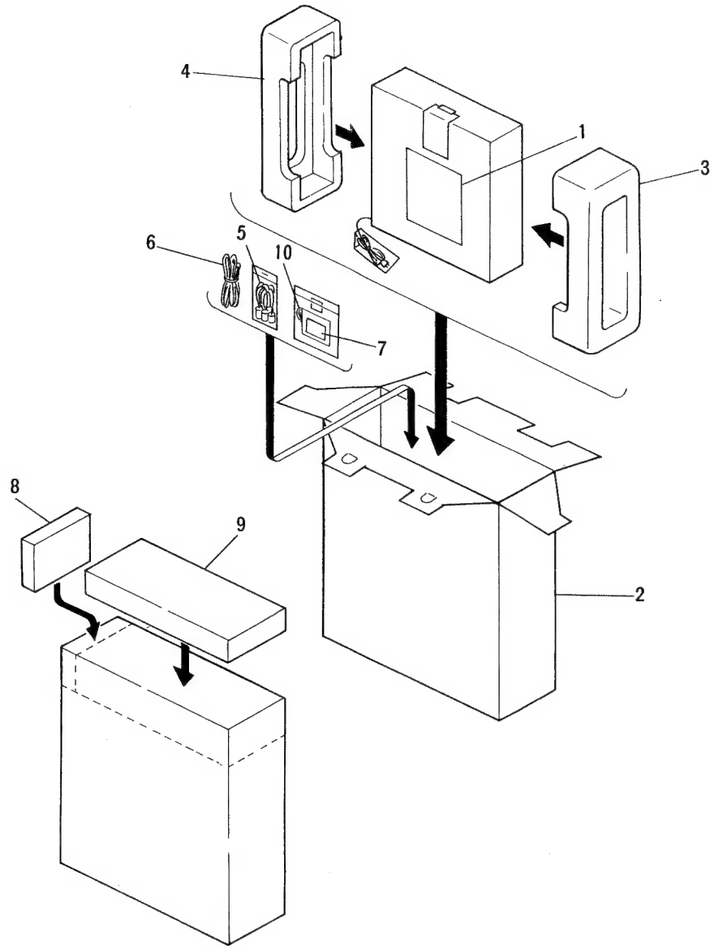
10. CIRCUIT DESCRIPTIONS



NOTE: FM NARROW Q511 IS TURNED OFF AND Q510 AND Q509 ARE INVERSED.



11. PACKING



Parts List of Packing

Mark	No.	Part No.	Description
	1.	ARB-654	Operating instructions
	2.	AHE-489	Packing case
	3.	AHA-248	Front pad
	4.	AHA-249	Rear pad
	5.	ADE-081	Connection cord (with pin plug)
	6.	ADH-005	FM antenna
	7.	AKX-080	Matching unit
	8.	AHA-397	Protector C
	9.	AMS-056	Side Board assembly
	10.	ATB-086	AM loop antenna assembly

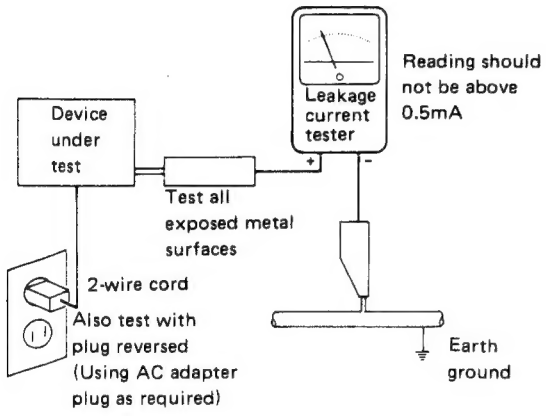
12. SAFETY INFORMATION

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.